

## THE DEVELOPMENT OF THE GLENLYON DAM

### DUMARESQ-BARWON BORDER RIVERS COMMISSION BRISBANE

#### ABSTRACT

The Glenlyon Dam, named after a property first settled in 1844, was constructed under the authority of the Dumaresq-Barwon Border Rivers Commission to relieve irrigation problems of agricultural landholders along the Border Rivers. The dam has a storage capacity of 261 000 megalitres and, with an annual supply of 98 000 megalitres, the area to which assured irrigation water is available can increase from 2350 hectares to 14 570 hectares.

The well established tobacco growing industry along the Dumaresq River in both New South Wales and Queensland suffered disastrously during 1940 from the effects of drought. Failure of water supplies brought determined and widespread agitation for the construction of a large capacity storage reservoir on the Dumaresq or the provision of a series of low level weirs to enable water supplies to be obtained during critical periods of low rainfall.

In succeeding years, as the area of tobacco increased, the demand for Government water conservation measures increased – so much so that in 1942 support was gained of the Australian Agricultural Council.

General investigations of the Border Streams had indicated a topographically suitable dam site at Mingoola, immediately below the confluence of Pike Creek and the Mole River with the Dumaresq River.

In 1943 a conference of senior officers of Government Departments from New South Wales and Queensland recommended an engineering investigation be undertaken as early as possible into a proposal which involved the construction of a large storage at Mingoola to provide a regulated flow of water downstream.

After further discussion between representatives of both States during which agreement was reached on administrative policy, the New South Wales - Queensland Border Rivers Agreement was realised. The Agreement was subsequently ratified by the Parliament of both States and the New South Wales - Queensland Border Rivers Act came into force on 1 July 1947.

The agreement had three main provisions.

(i) The construction of certain works on parts of those portions of the Severn, Dumaresq,

Macintyre and Barwon Rivers which constitute part of the boundary between New South Wales and Queensland for the furtherance of water conservation, water supply and irrigation in those States.

(ii) The cost of the works and of administration was to be borne by the States in equal shares and water made available as a result of the works should be available to the States in equal shares.

(iii) A body, to be known as the Dumaresq - Barwon Border Rivers Commission, was to be constituted, and charged with the duty of giving effect to the Agreement. The Commission would comprise three members, one member to be appointed by each State and the Chairman, a person not in the service of either State, to be appointed by the Premiers of New South Wales and Queensland.

Major works proposed included the construction of a dam on the Dumaresq River and the construction of six to twelve weirs to meet irrigation requirements along the rivers. Provision was also made for the construction of not more than four regulators in the effluent streams from the carrier rivers and for the taking over of the existing weirs near Mungindi and Goondiwindi by the Dumaresq - Barwon Border Rivers Commission.

#### INVESTIGATION AND DEVELOPMENT

Investigation and development of the scheme was undertaken by the Commission through the resources of the participating State Water Authorities. By 1960, a further four weirs (Bonshaw, Cunningham, Glenarbon and Boomi – the last mentioned in conjunction with a

regulator) had been completed, but although the weirs provided some storage on the river, the supply available in periods of low flow was still insufficient to meet the irrigation requirements of the existing riparian landholders who obtained supplies by pumping directly from the river.

Hydrologic analyses indicated that an insignificant additional supply would be available from further weirs unless provision was made for a major storage upstream to regulate flows. Because it was uneconomical to provide more weirs without a major storage, alternative sources of irrigation supplies were investigated.

Field investigations of the groundwater potential in the area were carried out in the years 1958–1960, the cost of which was shared equally by the two States. In 1965 a joint State report\* on the investigation concluded that while satisfactory stock watering supplies were available in the area, considerable variation in groundwater quality existed, and it could not be guaranteed that significant numbers of landholders would obtain worthwhile supplies for general irrigation. Subsequent investigations indicated that larger groundwater development was feasible with better extraction techniques, but the estimated supply was still far short of that needed, and the Commission and the States concluded that large scale groundwater development was not a viable economic alternative to the provision of a major upstream storage.

Detailed investigation of the Dumaresq site had shown the foundation conditions to be unsuitable and the Commission shifted its attention to the tributaries further upstream where more attractive sites, but for smaller storages existed. A geophysical survey was made at the sites of Pike Creek and the Mole River and preliminary comparative estimates were prepared to determine the relative economy of providing one large storage at Mingoola or two smaller storages on the tributaries. Following exploratory drilling, a Commission report\*\* dealing with alternative storage proposals and possible amendments to the existing agreement was submitted and an amending agreement was executed between the States.

## PROVISION FOR CONSTRUCTION OF DAM ON PIKE CREEK

The 1947 New South Wales-Queensland Border Rivers Act was amended on 4 November 1968. The amendment provided, among other things, for (1) the construction of storages on Pike Creek (Queensland) and the Mole River (New South Wales); (2) for the investigation and, subject to approval of the State Governments, construction of further weirs on the Border Rivers and works for the improvement of flow and of distribution of flow in the streams which intersect the New South Wales-Queensland border West of Mungindi; and (3) that the time of commencement of construction of the Pike Creek Dam be subject to the approval of the parties concerned, and the decision to construct the Mole Creek Dam be subject to approval by the States after considering the recommendations of a report by the Commission into the practicability of such a dam.

In the 1970/71 financial year, the State Governments authorised expenditure to cover the cost of detailed investigation and design of the Pike Creek Dam. In the 1972–73 financial year the States formally agreed that the Dam be constructed at an estimated cost of \$14 million and that construction commence on 1 July 1972.

## NAME OF DAM

The Commission considered it appropriate that the name of the dam should commemorate a name closely associated with the history of the area.

In an attempt to determine the location of the dam in relation to the original Mingoola and Glenlyon holdings, the commission consulted the records of the Oxley library in Brisbane, the Queensland State Archives, and the Mitchell Library in Sydney, and held discussions with descendants of early settlers of the area. The earliest reference found to the boundary between these holdings was in the Queensland Government Gazette of 28 January 1871, and this is presumably the original eastern boundary of Glenlyon, established when the holding was taken up by Alexander McLeod in 1844. It was described as:

\* 'Progress Report on Groundwater Investigation of Dumaresq River alluvium A.M.T.M. 25 to A.M.T.M. 110' -Irrigation and Water Supply Commission — June 1965.

\*\* 'Report on Works Proposed under The New South Wales-Queensland Border Rivers Agreement.' - Dumaresq Barwon Borders Rivers Commission — March 1961.

... the watershed (separating Pikes Creek and the Severn River) southerly to a tree on Pikes Creek marked broad arrow over M, then by the left bank of that creek downwards to its junction with the Severn River.

The dam, and the entire storage area is thus situated on the western side of this boundary, in the Glenlyon holding, and the name Glenlyon Dam was recommended to, and approved by, the two States and the Queensland Place Names Committee.

STRUCTURE AND CAPACITY

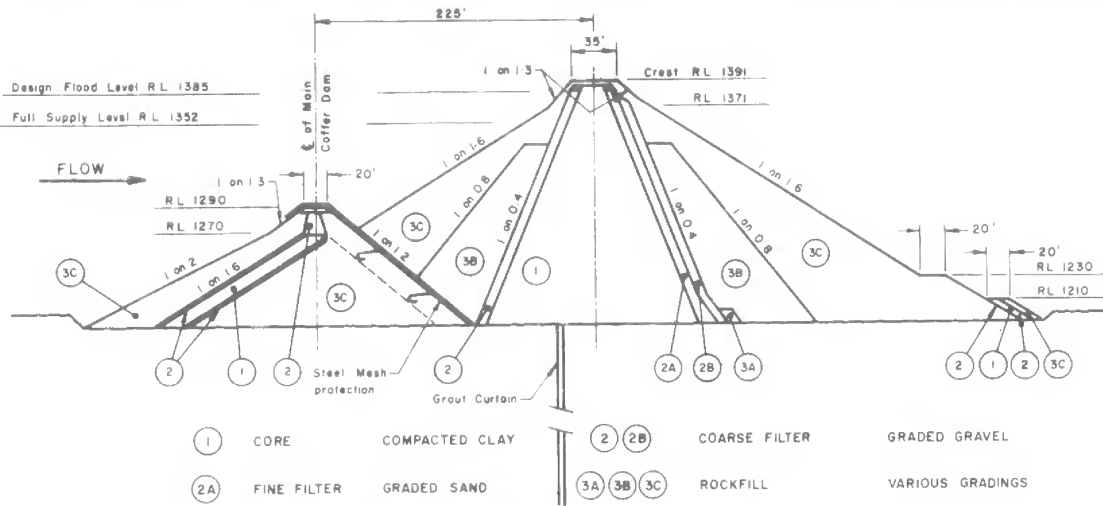
The dam is an earth and rockfill structure, 61 metres high, has a storage capacity of 261 000 megalitres, and commands a catchment area of 1326 square kilometres (Fig. 1). The embankment required a total of 915 000 cubic metres of

rockfill, 385 000 cubic metres of impervious core material, 128 000 cubic metres of filter material and some 10 720 cubic metres of concrete aggregate.

The spillway consists of an ungated concrete crest of width 74.4 metres discharging into a partly lined concrete channel which will pass flows back to the stream.

The outlet works are designed to utilise the 3.66 m diameter concrete lined diversion tunnel used during construction and will provide releases commensurate with downstream irrigation requirements. These works comprise an intake tower constructed at the upstream portal of the diversion tunnel, the tunnel itself, and a valve house at the downstream portal to regulate outflows.

Glenlyon Dam provides an annual assured supply of water for irrigation at Mingoola gauging



SECTION THROUGH EMBANKMENT  
GLENLYON DAM  
STATISTICS

CATCHMENT AREA	1326 km <sup>2</sup>	512 sq miles	VOLUME OF CONCRETE (TOTAL)	10 720 m <sup>3</sup>	14,020 c yds
STORAGE CHARACTERISTICS -			TUNNEL	3 540 m <sup>3</sup>	4,630 c yds
CAPACITY	261 000 MI	212,000 ac /ft	INLET TOWER	1 470 m <sup>3</sup>	1,920 c yds
SURFACE AREA	1 750 ha	4,300 acs	OUTLET WORKS	970 m <sup>3</sup>	1,270 c yds
LENGTH ALONG PIKE CK	27 km	17 miles	SPILLWAY & BRIDGE	4 740 m <sup>3</sup>	6,200 c yds
PRINCIPAL DIMENSIONS -			DIVERSION TUNNEL -		
HEIGHT OF EMBANKMENT ABOVE BED	61 m	200 ft	LENGTH	254.5 m	835 ft
LENGTH OF EMBANKMENT CREST	445 m	1,460 ft	DIAMETER AFTER LINING	3.66m	12 ft
WIDTH OF SPILLWAY	74.4 m	244 ft	OUTLET WORKS:-		
VOLUME OF FILL IN EMBANKMENT -			HIGH CAPACITY OUTLET DIA.	1 500 mm	60 ins
CLAY	385 000 m <sup>3</sup>	503,000 c yds	LOW CAPACITY OUTLET DIA.	600 mm	24 ins
FILTER	128 000 m <sup>3</sup>	167,000 c yds			
ROCK	915 000 m <sup>3</sup>	1,196,500 c yds			
TOTAL	1 428 000 m <sup>3</sup>	1,866,500 c yds			

FIG. 1: Statistics of the Glenlyon Dam.

station of 98 000 megalitres, shared equally between Queensland and New South Wales. The manner of distribution of released water from the dam is a matter for the individual States. It is envisaged that principal use will be made by individual riparian landholders pumping directly from the river.

Schemes such as community pumping, and reticulated channel development of lands away from the river are considered not economically justified in the short term, but these will probably prove viable in the longer term.

#### ANTICIPATED BENEFITS

The Border Rivers area is subject to low rainfall (480 to 660 mm per annum) and erratic and unreliable streamflows. In April 1973 there were 215 pumps in New South Wales and Queensland licensed to irrigate a total of 4900 hectares along 497 kilometres of the Border River System between the dam and Mungindi (where the river ceases to be the Border). Some 82 of these licenses, involving 2550 hectares of irrigation,

were unable to pump during periods of low flow, and only some 133 licenses involving 2350 hectares had an assured supply. These low flow conditions occurred for 200 days or more in 11 of the 27 years 1920–1946, with a maximum of 320 days in 1923; and for 170 days or more in each of the 10 years 1935–1944.

The supply of water from the dam will stabilise this situation and allow assured supplies of irrigation water for 14 570 hectares, an increase of 12 220 hectares over the 1973 figure.

Social and economic benefits expected to accrue from the scheme include: (a) the opportunity for landholders along the river to expand irrigation production which can be adapted to meet changing market situations; (b) integration with existing livestock production over a broader area, with provision of a large pool of annual fodder close to the grazing areas for supplementary and/or drought fodder; (c) decentralisation, by arresting drift of population from the project area; (d) additional advantages in increased business activity and retail trading in the area; and (e) a recreational facility for swimming, boating, water skiing and picnicing.